

What is claimed is:

1           1.     A packet communication method for a network having a  
2     plurality of bus systems interconnected by at least one bus bridge, wherein at  
3     least one node is attached to each of said bus systems, wherein said bus  
4     systems, said bridge and said node are in compliance to a serial bus standard,  
5     characterized in that said bus bridge establishes a connection between a first  
6     channel used in a first bus system of said plurality of bus systems for  
7     transmission of packets to a first multicast address and a second channel used  
8     in a second bus system of said plurality of bus systems for transmission of  
9     packets to a second multicast address if said first and second multicast  
10    addresses are equal to each other.

1           2.     A packet communication method for a network having a  
2     plurality of bus systems interconnected by at least one bus bridge, wherein at  
3     least one node is attached to each of said bus systems, wherein said bus  
4     systems, said bridge and said node are in compliance to a serial bus standard,  
5     characterized in that:  
6                said at least one node attached to each of said plurality of bus systems,  
7     when initiating a multicast packet transmission to a multicast group of the  
8     bus system, acquires a channel to be used for said multicast packet  
9     transmission and broadcasts a message pertaining to said channel; and  
10               said at least one bus bridge establishes a connection between channels  
11    acquired for different bus systems when said message is received from each  
12    of said different bus systems.

1           3.     A packet communication method for a network having an  
2 intermediate bus system connected between first and second bus systems by  
3 first and second bus bridges, wherein at least one node is attached to each of  
4 said bus systems, and wherein said bus systems, said bridge and said node  
5 are in compliance to a serial bus standard, characterized in that:  
6           said at least one node attached to each of said bus systems acquires a  
7 channel to be used for multicast packet transmission and broadcasts a  
8 message pertaining to said channel and a multicast group when initiating a  
9 multicast packet transmission to said multicast group;  
10          said first bus bridge acquires an interconnection channel if there is no  
11 node in said intermediate bus system participating in said multicast group  
12 and if two of said message having an identical multicast address are received,  
13 one from said first bus system and the other from said second bus system,  
14 broadcasts a message pertaining to said interconnection channel and said  
15 multicast group and connects a first end of the interconnection channel to the  
16 channel acquired for said first bus system; and  
17          said second bus bridge connects a second end of the interconnection  
18 channel to the channel acquired for the second bus system when said  
19 message is received from said first bus bridge.

1           4.     A packet communication method for a network having a  
2 plurality of bus systems interconnected by at least one bus bridge, wherein at  
3 least one node is attached to each of said bus systems, and wherein said bus  
4 systems, said bridge and said node are in compliance to a serial bus standard,  
5 characterized in that:  
6           said at least one node attached to each of said plurality of bus systems

7 acquires a first channel to be used for multicast packet transmission and  
8 broadcasts a first message containing information pertaining to said first  
9 channel and a multicast group when initiating a multicast packet  
10 transmission to said multicast group;

11 said at least one node on each of said bus systems when operating as a  
12 receive-only node acquires a second channel if said first message is received  
13 when the bus system of the receive-only node has no node responsible for  
14 channel acquisition, and broadcasts a second message pertaining to said  
15 second channel and said multicast group; and

16 said at least one bus bridge establishes an inter-channel connection  
17 between said first and second channels when said first and second messages  
18 are received.

1 5. The packet communication method of claim 3, wherein said first  
2 bus bridge is determined as a bridge responsible for acquisition of said  
3 interconnection channel depending on relative values of identifiers assigned  
4 to said first and second bus bridges.

1 6. The packet communication method of claim 3, wherein said first  
2 bus bridge is determined as a bridge responsible for acquisition of said  
3 interconnection channel depending on a random number.

1 7. A packet communication method for a network comprising a  
2 plurality of nodes, first and second bus systems to which said nodes are  
3 attached, and a bus bridge for performing a transfer of packets between said  
4 first and second bus systems, the method comprising the steps of:

5           a)     acquiring, at a first node attached to said first bus system, a first  
6     channel for transmission of packets to a first multicast address and  
7     broadcasting a first message pertaining to said first channel and said first  
8     multicast address;

9           b)     acquiring, at a second node attached to the second bus system, a  
10    second channel for transmission of packets to a second multicast address and  
11    broadcasting a second message pertaining to said second channel and said  
12    second multicast address; and

13          c)     receiving, at said bus bridge, the first and second messages and  
14    establishing a connection between two channels respectively identified by the  
15    received messages if the multicast addresses contained therein are equal to  
16    each other.

1           8.     A packet communication method for a network comprising first  
2     and second bus systems and an intermediate bus system between said first  
3     and second bus systems, a plurality of nodes attached to said first, second  
4     and intermediate bus systems, and a first bus bridge for performing a transfer  
5     of packets between said first and intermediate bus systems, and a second bus  
6     bridge for performing a transfer of packets between said intermediate and  
7     second bus systems, the method comprising the steps of:

8           a)     acquiring, at a first node attached to said first bus system, a first  
9     channel for transmission of packets to a first multicast address and  
10    broadcasting a first message pertaining to said first channel and said first  
11    multicast address;

12          b)     acquiring, at a second node attached to said second bus system,  
13    a second channel for transmission of packets to a second multicast address

14 and broadcasting a second message pertaining to said second channel and  
15 said second multicast address;

16 c) receiving, at said first bus bridge, the first and second messages  
17 and acquiring a third channel for transfer of packets on said intermediate bus  
18 system if the received first and second messages indicate that the multicast  
19 addresses contained therein are equal to each other, establishing a connection  
20 between a channel identified by the received first message and the acquired  
21 third channel, and broadcasting from said first bus bridge a third message  
22 pertaining to said third channel;

23 d) receiving, at said second bus bridge, the first and second  
24 messages from said first and second nodes and subsequently receiving said  
25 third message from said first bus bridge if the received first and second  
26 messages indicate that the multicast addresses contained therein are equal to  
27 each other, and establishing a connection between two channels respectively  
28 identified by the second and third messages.

1 9. A packet communication method for a network comprising a  
2 plurality of nodes, first and second bus systems to which said nodes are  
3 attached, and a bus bridge for performing a transfer of packets between  
4 adjacent said first and second bus systems, the method comprising the steps  
5 of:

6 a) acquiring, at a first node attached to said first bus system, a first  
7 channel for transmission of packets to a multicast address and broadcasting a  
8 first message pertaining to said first channel and said multicast address;

9 b) acquiring, at a second, receive-only node attached to said bus  
10 system, a second channel for reception of packets from the first node in

11 response to receipt of said first message and broadcasting a second message  
12 pertaining to said second channel and said multicast address;  
13 c) receiving, at said bus bridge, the first and second messages and  
14 establishing a connection between two channels respectively identified by the  
15 received first and second messages if multicast addresses contained therein  
16 are equal to each other.

1 10. The packet communication method of claim 7 or 9, wherein the  
2 step (c) comprises establishing said connection by converting a channel  
3 identifier contained in a multicast packet received on said first channel to a  
4 channel identifier identifying said second channel and converting a channel  
5 identifier contained in a multicast packet received on said second channel to a  
6 channel identifier identifying said first channel.

1 11. The packet communication method of claim 7 or 9, wherein said  
2 first and second messages further contain first and second bus identifiers  
3 respectively identifying said first and second bus systems, and wherein said  
4 bus bridge has first and second ports respectively connected to said first and  
5 second bus systems, and wherein the step (c) comprises establishing said  
6 connection if the bus bridge receives said first message through said first port  
7 and said second message through said second port and if said first and  
8 second bus identifiers respectively contained in said first and second  
9 messages indicate that said bus bridge is directly connected to said adjacent  
10 bus systems.

1 12. The packet communication method of claim 8, wherein the step

2 (c) comprises:

3 establishing said connection, at said first bus bridge, by converting a  
4 channel identifier contained in a multicast packet received on said first  
5 channel to a channel identifier identifying said third channel and converting  
6 a channel identifier contained in a multicast packet received on said third  
7 channel to a channel identifier identifying said first channel, and

8 establishing said connection, at said second bus bridge, by converting  
9 a channel identifier contained in a multicast packet received on said second  
10 channel to a channel identifier identifying said third channel and converting  
11 a channel identifier contained in a multicast packet received on said third  
12 channel to a channel identifier identifying said second channel.

1 13. The packet communication method of claim 8, wherein said first  
2 and second messages further contain first and second bus identifiers  
3 respectively identifying said first and second bus systems, and wherein said  
4 first bus bridge has first and second ports respectively connected to said first  
5 and intermediate bus systems, and said second bus bridge has first and  
6 second ports respectively connected to said intermediate and second bus  
7 systems, wherein the step (c) comprises:

8 establishing said connection, at said first bus bridge, if the first bus  
9 bridge receives said first message through said first port and said second  
10 message through said second port and if said first and second bus identifiers  
11 respectively contained in said first and second messages indicate that the first  
12 bus bridge is directly connected to said first bus system, and

13 establishing said connection, at said second bus bridge, if the second  
14 bus bridge receives said first message through said first port and said second

15 message through said second port and if said first and second bus identifiers  
16 respectively contained in said first and second messages indicate that the  
17 second bus bridge is directly connected to said second bus system.

1 14. The packet communication method of claim 8, wherein said first  
2 bus bridge is determined as a bridge responsible for acquisition of said third  
3 channel depending on relative values of identifiers assigned to said first and  
4 second bus bridges.

1 15. The packet communication method of claim 8, wherein said first  
2 bus bridge is determined as a bridge responsible for acquisition of said third  
3 channel depending on a random number.

1 16. A bus bridge for interconnecting a plurality of bus systems of a  
2 packet communication network, each of said bus systems including at least  
3 one node, wherein said bus systems, said bridge and said node are in  
4 compliance to a serial bus standard, characterized in that said bus bridge  
5 establishes a connection between a first channel used in a first bus system of  
6 said plurality of bus systems for transmission of packets to a first multicast  
7 address and a second channel used in a second bus system of said plurality of  
8 bus systems for transmission of packets to a second multicast address if said  
9 first and second multicast addresses are equal to each other and said first and  
10 second channels have different channel identifiers from each other.

1 17. A packet communication network comprising a plurality of bus  
2 systems interconnected by at least one bus bridge, wherein at least one node



3 is attached to each of said bus systems, and wherein said bus systems, said  
4 bridge and said node are in compliance to a serial bus standard, characterized  
5 in that:

6 said at least one node attached to each of said plurality of bus systems,  
7 when initiating a multicast packet transmission to a multicast group of the  
8 bus system, acquires a channel to be used for said multicast packet  
9 transmission and broadcasts a message containing information pertaining to  
10 said channel; and

11 said at least one bus bridge establishes a connection between channels  
12 acquired for different bus systems when said message is received from each  
13 of said different bus systems.

1 18. A packet communication network comprising an intermediate  
2 bus system connected between first and second bus systems by first and  
3 second bus bridges, wherein at least one node is attached to each of said bus  
4 systems, and wherein said bus systems, said bridge and said node are in  
5 compliance to a serial bus standard, characterized in that:

6 said at least one node attached to each of said bus systems is  
7 responsible for acquisition of a channel to be used for multicast packet  
8 transmission and broadcasts a message containing information pertaining to  
9 said channel and a multicast group when initiating a multicast packet  
10 transmission to said multicast group;

11 said first bus bridge acquires an interconnection channel if there is no  
12 node in said intermediate bus system participating in said multicast group  
13 and if two of said message having an identical multicast address are received,  
14 one from said first bus system and the other from said second bus system,

15 broadcasts a message pertaining to said interconnection channel and said  
16 multicast group and connects a first end of the interconnection channel to the  
17 channel acquired for said first bus system; and  
18       said second bus bridge connects a second end of the interconnection  
19 channel to the channel acquired for the second bus system when said  
20 message is received from said first bus bridge.

1       19.   A packet communication network comprising a plurality of bus  
2 systems interconnected by at least one bus bridge, wherein at least one node  
3 is attached to each of said bus systems, and wherein said bus systems, said  
4 bridge and said node are in compliance to a serial bus standard, characterized  
5 in that:

6       said at least one node attached to each of said plurality of bus systems  
7 acquires a first channel to be used for multicast packet transmission and  
8 broadcasts a first message containing information pertaining to said first  
9 channel and a multicast group when initiating a multicast packet  
10 transmission to said multicast group;

11       said at least one node on each of said bus systems when operating as a  
12 receive-only node acquires a second channel if said first message is received  
13 when the bus system of the receive-only node has no node responsible for  
14 channel acquisition, and broadcasts a second message pertaining to said  
15 second channel and said multicast group; and

16       said at least one bus bridge establishes an inter-channel connection  
17 between said first and second channels when said first and second messages  
18 are received.

1           20.    The packet communication network of claim 19, wherein said  
2 first bus bridge is determined as a bridge responsible for acquisition of said  
3 interconnection channel depending on relative values of identifiers assigned  
4 to said first and second bus bridges.

1           21.    The packet communication network of claim 19, wherein said  
2 first bus bridge is determined as a bridge responsible for acquisition of said  
3 interconnection channel depending on a random number.

1           22.    A packet communication network comprising:  
2 a plurality of nodes;  
3 first and second bus systems to which said nodes are attached; and  
4 a bus bridge for performing a transfer of packets between said first  
5 and second bus systems;  
6 a first node attached to said first bus system acquiring a first channel  
7 for transmission of packets to a first multicast address and broadcasting a  
8 first message pertaining to said first channel and said first multicast address;  
9 a second node attached to the second bus system acquiring a second  
10 channel for transmission of packets to a second multicast address and  
11 broadcasting a second message pertaining to said second channel and said  
12 second multicast address,  
13 said bus bridge receiving the first and second messages and  
14 establishing a connection between two channels respectively identified by the  
15 received messages if the multicast addresses contained therein are equal to  
16 each other.

1           23.    A packet communication network comprising:  
2           first and second bus systems and an intermediate bus system between  
3   said first and second bus systems;  
4           a plurality of nodes attached to said first, second and intermediate bus  
5   systems;  
6           a first bus bridge for performing a transfer of packets between said  
7   first and intermediate bus systems;  
8           a second bus bridge for performing a transfer of packets between said  
9   intermediate and second bus systems;  
10          a first node attached to said first bus system acquiring a first channel  
11   for transmission of packets to a first multicast address and broadcasting a  
12   first message pertaining to said first channel and said first multicast address,  
13          a second node attached to said second bus system acquiring a second  
14   channel for transmission of packets to a second multicast address and  
15   broadcasting a second message pertaining to said second channel and said  
16   second multicast address,  
17          said first bus bridge receiving the first and second messages, acquiring  
18   a third channel for transfer of packets on said intermediate bus system if the  
19   received messages indicate that the multicast addresses contained therein are  
20   equal to each other, establishing a connection between a channel identified by  
21   the received first message and the acquired third channel, and broadcasting a  
22   third message pertaining to said third channel,  
23          said second bus bridge receiving the first and second messages, and  
24   subsequently receiving said third message if the received first and second  
25   messages indicate that the multicast addresses contained therein are equal to  
26   each other, and establishing a connection between two channels respectively

27 identified by the second and third messages.

1        24. A packet communication network comprising:  
2        a plurality of nodes;  
3        first and second bus systems to which said nodes are attached; and  
4        a bus bridge for performing a transfer of packets between adjacent said  
5 first and second bus systems,  
6        a first node attached to said first bus system acquiring a first channel  
7 for transmission of packets to a multicast address and broadcasting a first  
8 message pertaining to said first channel and said multicast address,  
9        a second, receive-only node attached to said bus system acquiring a  
10 second channel for reception of packets from the first node in response to  
11 receipt of said first message and broadcasting a second message pertaining to  
12 said second channel and said multicast address,  
13        said bus bridge receiving the first and second messages and  
14 establishing a connection between two channels respectively identified by the  
15 received first and second messages if multicast addresses contained therein  
16 are equal to each other.

1        25. The packet communication network of claim 22 or 24, wherein  
2 said bus bridge establishes said connection by converting a channel identifier  
3 contained in a multicast packet received on said first channel to a channel  
4 identifier identifying said second channel and converting a channel identifier  
5 contained in a multicast packet received on said second channel to a channel  
6 identifier identifying said first channel.

1           26.    The packet communication network of claim 22 or 24, wherein  
2   said first and second messages further contain first and second bus identifiers  
3   respectively identifying said first and second bus systems, and wherein said  
4   bus bridge has first and second ports respectively connected to said first and  
5   second bus systems and establishes said connection if the bus bridge receives  
6   said first message through said first port and said second message through  
7   said second port, and if said first and second bus identifiers respectively  
8   contained in said first and second messages indicate that said bus bridge is  
9   directly connected to said adjacent bus systems.

1           27.    The packet communication network of claim 23, wherein said  
2   first bus bridge establishes said connection by converting a channel identifier  
3   contained in a multicast packet received on said first channel to a channel  
4   identifier identifying said third channel and converting a channel identifier  
5   contained in a multicast packet received on said third channel to a channel  
6   identifier identifying said first channel, and

7           wherein said second bus bridge establishes said connection by  
8   converting a channel identifier contained in a multicast packet received on  
9   said second channel to a channel identifier identifying said third channel and  
10   converting a channel identifier contained in a multicast packet received on  
11   said third channel to a channel identifier identifying said second channel.

1           28.    The packet communication network of claim 23, wherein said  
2   first and second messages further contain first and second bus identifiers  
3   respectively identifying said first and second bus systems, and wherein said  
4   first bus bridge has first and second ports respectively connected to said first

5 and intermediate bus systems, and said second bus bridge has first and  
6 second ports respectively connected to said intermediate and second bus  
7 systems,

8 wherein each of said first and second bus bridges establishes said  
9 connection if the bus bridge receives said first message through said first port  
10 and said second message through said second port, and if said first and  
11 second bus identifiers respectively contained in said first and second  
12 messages indicate that the first and second bus bridges are directly connected  
13 to said first and second bus systems, respectively

1 29. The packet communication network of claim 23, wherein said  
2 first bus bridge is determined as a bridge responsible for acquisition of said  
3 third channel depending on relative values of identifiers assigned to said first  
4 and second bus bridges.

1 30. The packet communication network of claim 23, wherein said  
2 first bus bridge is determined as a bridge responsible for acquisition of said  
3 third channel depending on a random number.